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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,979	09/22/2006	Satoshi Aoyama	128212	3247
25944 7590 04/28/2009 OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850				
EXAMINER GREENE, JASON M				
ART UNIT 1797		PAPER NUMBER		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/593,979

Applicant(s)

AOYAMA ET AL.

Examiner

Jason M. Greene

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9, 10 and 12-14 is/are rejected.
- 7) ☒ Claim(s) 8 and 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF-08)  
Paper No(s)/Mail Date 9/22/06: 3/4/09
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Ito et al. (US 2003/0061937 A1).

Ito et al. discloses a hydrogen permeable membrane for selectively allowing hydrogen to permeate through comprising a metal base layer (LA) comprising vanadium, a metal coating layer (LC1 or LC2) comprising palladium, and an intermediate layer (LB1 or LB2) that is formed between the metal base layer and the metal coating layer and is made of single metal element (nickel or cobalt) having a higher melting point than the metal base layer and the metal coating layer and possessing hydrogen permeability in Figs. 3 and 5-7 and paragraphs [0043] to [0046].

Regarding claim 13, Ito et al. teaches the membrane being used in a hydrogen extraction apparatus in Fig. 1 and paragraph [0077].

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alvin et al. (US 7,018,446 B2) in view of Ito et al. (US 2003/0061937 A1).

With regard to claims 1-6, Alvin et al. discloses a hydrogen permeable membrane for selectively allowing hydrogen to permeate through comprising a metal base layer (10), a metal coating layer (32) comprising palladium, and an intermediate layer (30) that is formed between the metal base layer and the metal coating layer and is made of a metal (tantalum and/or niobium) having a higher melting point than the metal base layer and the metal coating layer and possessing hydrogen permeability in Fig. 23, line 44 to col. 7, line 63.

Alvin et al. does not teach the metal base layer comprising vanadium, but Ito et al. teaches a similar hydrogen separation membrane wherein the base layer is vanadium in Figs. 3 and 5-7 and paragraphs [0043] to [0046].

It would have been obvious to one of ordinary skill in the art to substitute the vanadium base layer of Ito et al. for the metal support of Alvin et al. in that both references are directed to hydrogen separation using multilayer metallic membrane structures.

With regard to claim 7, Alvin et al. does not teach the intermediate layer comprising V or Pd, but Ito et al. recognized and teaches that vanadium can be used interchangeably with Ta or Nb in paragraph [0044]. Thus one of ordinary skill in the art would have recognized that an alloy of either Ta or Nb and V could be used as the intermediate layer of Alvin et al. since the three metals are known in the art to have very similar properties as regards hydrogen permeation and stability.

With regard to claim 13, Alvin et al. teaches the membrane being used in a hydrogen extraction apparatus in col. 2, line 62 to col. 3, line 1.

5. Claims 1, 2, 4-6, 10, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. (US 7,255,726 B2) in view of Ito et al. (US 2003/0061937 A1).

Ma et al. discloses a hydrogen permeable membrane for selectively allowing hydrogen to permeate through comprising a metal base layer (12), a metal coating layer (16) comprising palladium, and an intermediate layer (14) that is formed between the metal base layer and the metal coating layer and is made of a metal (tungsten and/or silver) having a higher melting point than the metal base layer and the metal coating layer and possessing hydrogen permeability in Fig. 1 and col. 6, line 7 to col. 9, line 42.

Ma et al. does not teach the metal base layer comprising vanadium, but Ito et al. teaches a similar hydrogen separation membrane wherein the base layer is vanadium in Figs. 3 and 5-7 and paragraphs [0043] to [0046].

It would have been obvious to one of ordinary skill in the art to substitute the vanadium base layer of Ito et al. for the metal support of Ma et al. in that both references are directed to hydrogen separation using multilayer metallic membrane structures.

With regard to claims 13 and 14, Ma et al. teaches the membrane being used in a hydrogen extraction apparatus and being produced by the claimed process in Fig. 1, col. 1, lines 12-21 and col. 6, line 7 to col. 9, line 42

6. Claims 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 2003/0061937 A1).

Ito et al. teaches the intermediate layer comprising nickel or cobalt, but does not explicitly teach using an alloy of the two metals. However, one of ordinary skill would have recognized that an alloy of the two metals (wherein either of the metals is considered to be the additive metal) could be used since the metals are taught as being used interchangeably.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimanuki et al. (US 6,740,432 B1) in view of Ito et al. (US 2003/0061937 A1).

Shimanuki et al. teaches a fuel cell as claimed in Fig. 1, except for the hydrogen permeable membrane (42) having the structure recited in claim 1. However, as noted above, Ito et al. teaches such a membrane for fuel cell applications in Figs. 3 and 5-7 and paragraphs [0043] to [0046].

***Allowable Subject Matter***

8. Claims 8 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: The prior art made of record does not teach or fairly suggest the membrane of claim 5 wherein the intermediate layer comprises first and second intermediate layers having the recited compositions.

***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Buxbaum, Bossard et al., Foley, Jr. et al. and JP 2004-344731 references disclose similar systems.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (571) 272-1157. The examiner can normally be reached on Monday - Friday (9:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jason M. Greene  
Primary Examiner  
Art Unit 1797

/Jason M. Greene/  
4/24/09

jmg  
April 24, 2009